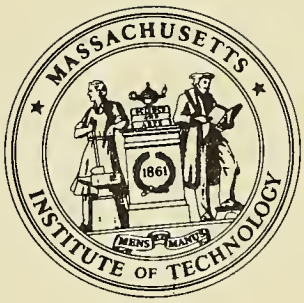

working paper
department
of economics

INFLATION AND THE COMPREHENSIVE TAX BASE

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Number 98 January 1973

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The views expressed in this paper are the author's sole responsibility and do not reflect those of the Department of Economics nor of the Massachusetts Institute of Technology.

INFLATION AND THE COMPREHENSIVE TAX BASE*

P.A. Diamond

I. Introduction

Economists generally would probably favor a tax base of real income, if it were not felt that administrative complexities would be excessive.[1] Given these complexities fairly wide consensus has formed on the approximation given by money income and the term comprehensive tax base (CTB) has been given to the inclusion in the tax base of the money value of all income, whether a money return, income in kind, or capital gain.[2] It has been widely recognized, usually in discussions of the treatment of capital gains, that inflation causes monetary gains that do not reflect real income increases. This point however is often passed over by pointing out that wage increases in inflationary times also reflect gains that are not real[3] and/or by mentioning that individuals receiving capital gains as a result of inflation are better off (than interest recipients say) and are therefore fit subjects for heavy taxation.[4]

The focus of this note is to dispute the force of these two arguments by discussing the familiar distinction between expected and unexpected inflation, arguing that the former is the more relevant concept

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*The author wishes to thank E. Cary Brown for helpful comments, Martin Hellwig for research assistance, and the National Science Foundation for financial support.

[1]See, e.g., Richard A. Musgrave, The Theory of Public Finance, 1959, p. 168.

[2]See, e.g., Musgrave, op. cit., p. 165; Report of the Royal Commission on Taxation, 1966, Vol. 1, p. 6; Henry Simons, Personal Income Taxation, 1938, p. 49.

[3]See, e.g., Harold M. Groves, "Taxation of Capital Gains" in Tax Revision Compendium, Vol. 2, p. 1199.

[4]See e.g., Report, Vol. 2, p. 349.

today and developing the difference in impact of expected inflation on wage and capital incomes. An unfortunate feature of the CTB approach as currently formulated is the high sensitivity to the rate of inflation of the relative contributions to the tax base of wage and capital income.[5] Thus it will be argued that expected inflation affects capital and labor income differently, but affects all forms of capital income in the same way. These arguments, however, are in no sense a defense of the current tax structure, particularly in the inclusion of only half of capital gains. Rather, it is an argument for an adjustment for inflation of all return to capital, with the amount of adjustment related to the amount of capital, not the amount of income. Specifically, I shall consider an inflation exclusion, allowing the deduction from taxable income of the inflation rate over the life of an asset times the basis of the asset. The timing of the deduction considered will vary with assets, being accrued for assets paying primarily interest income and deductible only on realization for assets with a sizeable capital gains component. This proposal is not new, having been summarily dismissed[6] at least as early as 1938, and discussed a number of times since.[7] However the level of

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[5]The main distinction between capital and labor incomes for our purposes is the inability to sell the capitalized value of the latter and thus the absence of taxation on capital gains due to a rise in future wage income. Taxation of real income would start with an inflation adjustment for capital as proposed here and then divide all incomes by a price index. This is equivalent to a change in tax rates after the inflation adjustment.

[6]H. Simons op. cit., p. 155.

[7]A favorable comment was made by Ralph Turvey, "Equity and a Capital Gains Tax," Oxford Economic Papers (June 1960), p. 189.

tax administration which has been reached in the US today seems to me to make both feasible and desirable this approach to income taxation. Since this argument is an equity argument on the relative treatment of capital and labor incomes, it has relevance only for the individual income tax. The use of a CTB approach for the corporation tax seems perfectly reasonable, with the refinement of the CTB approach to include an inflation adjustment applicable only for the individual income tax.[8]

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[8]This discussion will follow the public finance tradition of determining the desirable tax structure on equity considerations alone, ignoring any arguments for differential treatment of different kinds of income arising from differing supply elasticities and the necessity of considering efficiency as well as equity in maximizing social welfare.

II. Anticipated Inflation

Let us begin by reviewing how a fully anticipated inflation would affect an economy without taxes. If inflation were expected at i per cent next year both demanders and suppliers of labor would agree to have wages rise by an additional i per cent next year, compared with the situation of a zero anticipated inflation rate. Lenders and borrowers of funds would agree to an increase in the interest rate by i percentage points. Holders of equity would find that the profits of the firms whose shares they hold increase i per cent faster. If real dividend policy were unchanged, dividends would be i percent higher and capital gains a greater percentage of capital values by i percent. Stating this formally, let us write the cumulative inflation factor by I(t)

$$I(t) = \exp \int_0^t i(s)ds \tag{1}$$

Then wage income in the presence of inflation, $w'(t)$, differs from wage income in the absence of inflation, $w(t)$, by the inflation factor

$$w'(t) = w(t)I(t) \tag{2}$$

If we consider total capital income at time t, $y(t)$, we know with perfect capital markets that this must equal the interest rate times the value of assets

$$y(t) = r(t)V(t) \tag{3}$$

In the presence of inflation, values and the interest rate rise

$$V'(t) = V(t)I(t) \tag{4}$$

$$r'(t) = r(t) + i(t) \tag{5}$$

Thus money income from capital satisfies

$$y'(t) = (r(t) + i(t))V(t)I(t) = \frac{r(t) + i(t)}{r(t)}\, y(t)I(t) \tag{6}$$

Comparing (2) and (6) we see the shortcoming of the comprehensive tax base approach applied to money income. The presence of a positive inflation rate results in a greater percentage increase in taxable income from capital than from income from labor:

$$\frac{y'(t)}{w'(t)} = \frac{r(t) + i(t)}{r(t)}\, \frac{y(t)}{w(t)} \tag{7}$$

It is clear from these equations that a deduction of the inflation rate times the value of assets will preserve the relative contributions to the tax base of the two sources of income

$$\frac{y'(t) - iV'(t)}{w'(t)} = \frac{y(t)}{w(t)} \tag{8}$$

Paralleling the analysis of Paul Samuelson,[9] these conclusions reached from calculations made in the absence of taxes, remain valid in the presence of a comprehensive income tax, with or without an inflation exclusion, provided the capital gains measured for income tax purposes are accrued economic capital gains. The formal analysis of this proposition is contained in the appendix. The difficulties created by the use of realization rather than accrual for capital gains taxation are more difficult than I can deal with.

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[9] "Tax Deductibility of Economic Depreciation to Insure Invariant Valuations", J. of Political Economy (1964), 604-6.

III. Unanticipated Inflation

Clearly, no one would argue that all economic agents in the U.S. today accurately forecast inflation rates into the indefinite future. There is a similar lack of plausibility in the view that no one expects an increase in the consumer price index and everyone is continually surprised. Rather, it seems reasonable to believe that most people have subjective probabilities about future inflation rates and base their economic decisions on these beliefs, being affected both by their expected inflation rates and the realization that the inflation rate may well be different from what is expected. From the viewpoint of equitable taxation, the relevant point is that in generally inflationary times, people will expect inflation, causing interest rates to be higher than they would be if there were no inflation (and no expected inflation). Thus the return to all capital (and not just equity capital) tends to rise in inflationary time, shifting the balance of taxation against capital as described above. This effect of inflation on interest rates has been analyzed by Martin Feldstein and Otto Eckstein,[10] who related interest rates to inflation expectations and inflation expectations to past inflation rates. Combining the two effects they find that past inflation rates do affect interest rates and that a long lasting one percentage point rise in the inflation rate results in an approximately one percentage point rise in interest rates.

Thus the general view that the return to all capital is affected by anticipated inflation, and can be approximated by actual inflation

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[10] "The Fundamental Determinants of the Interest Rate", Review of Economics and Statistics, Nov. 1970, 363-75.

receives some support from this empirical work. This argument is not meant to suggest that people aren't frequently pleased or disappointed by the particular inflation pattern which appears, just as investors facing technological uncertainty sometimes get more and some times less than they anticipated. However, we cannot say that a bondholder is hurt by the inflationary process unless we know that the inflation rate has exceeded the rise in the interest rate which was induced by the expectations of inflation held by the community. By adjusting for the actual inflation rate we are treating the risks of wrong inflationary expectations in a similar fashion to the risks borne in the face of technological uncertainty.[11]

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[11] In times of extreme inflationary increases, such as war time, it may be appropriate to limit the inflation exclusion to a lower rate reflecting expectations.

IV. Application to Different Assets

Equity and efficiency considerations both call for the inflation exclusion to be available for any type of investment. This is necessary if the current waste of resources used to convert other types of income into capital gains is to be avoided. But there are several obvious difficulties if the inflation exclusion is to be available with all assets. The asset most obviously raising difficulties is cash. Since cash earns a zero monetary gain (although it has nonmonetary benefits relative to less liquid, higher yield assets) the application of an inflation deduction with full loss offset to cash would call for tax credits for individuals holding cash. The accounting and record keeping that would be involved seems prohibitive and the nontaxation of liquidity benefits would make the credit unfair. It is thus appealing to adjust for inflation by means of an exclusion only allowing no tax credit for the failure of cash to yield at least the inflation rate.[12] Thus gains in excess of the exclusion would receive the fixed exclusion, gains below the exclusion would not be taxed, and losses could be offset against other income. To apply this approach to all assets, we would want to pool assets of a type in calculating gain and exclsuion, and also to adjust for individual assets with payments at several dates.[13] Some carryover of unused exclusion for some assets (i.e., apart from cash) may also be appropriate.

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[12] An alternative approach is to treat different assets differently relative to offsets.

[13] The presence of the same tax rates for different sources of income removes one reason for restricting loss offsets. However the control of timing arising from taxing realized gains would still be in the hands of tax payers and may be reason enough to limit offsets to carryovers.

An asset leading to a straightforward tax treatment is a savings account where there is a return flow but no fluctuation in the monetary value of the asset. The exclusion should be available for application against interest income. The administration of this part of the tax structure is easy. Information returns would contain the interest rate used in generating earnings. If this is less than the inflation rate, the income is not taxable. If the interest rate exceeds the inflation rate the addition to taxable income is the level of earnings multiplied by the ratio of the interest rate minus the inflation rate to the interest rate. The same adjustment needs to be applied to deductions of interest expenses. This would have the additional benefit of reducing the current tax advantage for owner occupied housing arising from the absence of taxation of imputed rental income.

A greater complication arises with assets having both an annual return (of either interest or dividends) and a fluctuating value and so the potential for capital gain. Should the exclusion be applied to dividends or to equity capital gains upon realization? Should it apply to interest or to capital gains on bonds (which will be zero if the bonds are held to maturity)? This timing problem is part of the general problem arising from the taxation of realized rather than accrued gains. It seems to me best to defer the advantages of the inflation exclusion until the realization of the capital gain with an asset generally subject to fluctuation in value. Equity would now require offsets for gains less than the inflation rate, up to a maximum of the dividends which were subject to taxation. Given this approach the accounting for tax purposes

would not be complicated since the basis (which is multiplied by the inflation rate to determine the exclusion) would be reported at the time of calculation of the exclusion. Deferral of the exclusion until realization would lessen the advantages to the tax payer arising from use of the realization concept for gains.

V. Depreciation

The analysis thus far has been built around the model of financial assets, where taxation of capital gains only occurs upon realization. This leaves the question of the adjustment of real assets where depreciation is allowed by schedule and recapture applied upon sale, when necessary. In theory the model is exactly the same as with financial assets, a measurement of the true change in market value, adjusted for the inflation rate. In practice, attempts to measure changes in value are not made until sale occurs, and fixed schedules (straight line, declining balance, etc.) are applied. If one believed that the schedules were good approximations of change in value, one would merely add the inflation exclusion (applied to the adjusted basis) to the allowable depreciation. However, since a policy of accelerated depreciation has been followed to encourage investment and enhance profits, this advantage should not be available until depreciation rates are felt to be in line with actual depreciation.

VI. Lock-In

The taxation of capital gains on a realization basis creates both equity and efficiency problems. The equity problem arises from the postponement of tax on gain with delayed realization. (The even more severe problem of avoding taxation by holding until death is easily avoidable). The efficiency problem arises from the familiar lock-in effect - that individuals with accrued gains do not find it in their interest to switch to investments with higher yields. The degree of lock-in arising from a tax system obviously depends on the level of tax revenue. Thus the change from including half of capital gains to full taxation plus an inflation exclusion will tend to increase the lock in effect in that taxation of capital gains will probably be heavier than with the present system. Offsetting this impact will be a tendency toward decreased lock-in since the size of the inflation exclusion depends on the size of the basis of the asset, so that unrealized gains do not give rise to additional amounts of exclusion. In addition, the pattern of lock-in across assets with different relative amounts of unrealized gains is different under the two systems. Let us consider these points in a simple example.

Consider an asset purchased at A, now worth B, and going to C. Consider an alternative asset also giving rise to capital gains. Then we can ask what rate of return on the alternative asset will yield the same after tax position. Let us assume a 50% tax rate and 1/2 inclusion of gains. Then holding the current asset will yield an after tax wealth of $1/4\ A + 3/4\ C$. (This is calculated as before tax wealth, C, minus

the tax rate (1/2) times the inclusion rate (1/2) times the gain, C - A.) Alternatively selling now will yield 1/4 A + 3/4 B after tax. Investing in an asset with a growth factor R (i.e. R is one plus the growth rate) will result in an after tax position (1/4 A + 3/4 B)(1/4 + 3/4 R). Equating the after tax position under the two alternatives and solving for R we have that growth factor which will just induce a portfolio change

$$R = \frac{4C + A - B}{4B + A - B} \tag{9}$$

As is well known, for $C > B > A$, R will exceed the growth factor, C/B, of the asset with the accrued unrealized gain.

To examine the inflation exclusion with the same tax rate, 50%, let us assume that the inflation rate over the period of accrued gain was i and the inflation rate for the future period will be j. Holding the current asset will result in an after tax wealth $1/2\ A(1 + i + j + ij) + 1/2\ C$. (This is calculated as wealth, C, minus the tax rate, 1/2, times the capital gain, C - A, plus the tax rate 1/2, times the basis, A, times the inflation rate over the entire holding period, $i + j + ij$.) Alternatively, selling the asset now will give an after tax wealth of $1/2\ A(1 + i) + 1/2\ B$. Investing in an asset with a growth factor ρ will result in an after tax wealth $(1/2\ A(1 + i) + 1/2\ B)(1/2)(1 + j + \rho)$. Equating the after tax positions with the alternative investments and solving for ρ we have the growth factor which will just induce a portfolio change

$$\rho = \frac{2C + A(1 + i + j + ij) - B(1 + j)}{2B + A(1 + i) - B} \tag{10}$$

For the case $C > (1 + j)B$, $B > (1 + i)A$ we have $\rho > C/B$ and so a lock-in effect.

The interesting question is to compare ρ with R. From the two expressions we can solve for the difference between them

$$R - \rho = \frac{j(3B + A)(B - A - iA) + 4(C - B)(iA - 1/2(B - A))}{(A + 3B)(A + B + iA)} \qquad (11)$$

The denominator of this expression is positive, so we can concentrate on the numerator. The two terms reflect the two differences mentioned above. From the second term we see that the lock-in is more severe in the current system[14] ($R > \rho$) if the taxable accrued unrealized gains, $B - A - 1/2(B - A)$, are greater than those with an inflation exclusion, $B - A - iA$. From the first term we see that the lock-in is more severe with the existing system provided there are taxable unrealized gains under an inflation exclusion $B - A - iA > 0$, and inflation is expected, $j > 0$. Thus, the relation of untaxed portion of capital gain to basis rather than to the level of gain decreases the lock-in effect.

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[14] Assuming a capital gain is expected with the current asset, $C > B$.

VII. Choice of a Price Index

The general principles argued above call for an adjustment which uses the same price index for all individuals but it does not select the appropriate one. It is not clear that there is any one particularly good choice, nor is it clear whether it matters a great deal what index is chosen although the level of taxation will clearly vary with the choice of index. For a general reference on the magnitudes being considered I have reproduced the consumer price index for urban wage earners and clerical workers and the Standard and Poor common stock total price index. (Source: Economic Report of the President, 1972.) From these the relative tax bases under current taxation and an inflation exclusion have been calculated assuming that gains in the stock index are realized.

Year	Price Level	Stock Index	1/2 % Δ Stock Index	% Δ Stock Index - % Δ Price Level
1955	80.2	40.49		
1956	81.4	46.62	7.6	13.7
1957	84.3	44.38	- 2.4	- 8.4
1958	86.6	46.24	2.1	1.5
1959	87.3	57.38	12.1	23.3
1960	88.7	55.85	- 1.4	- 4.3
1961	89.6	66.27	9.4	17.7
1962	90.6	62.38	- 3.0	- 7.0
1963	91.7	69.87	6.0	10.8
1964	92.9	81.37	8.3	15.2
1965	94.5	88.17	4.2	6.6
1966	97.2	85.26	- 1.7	- 6.2
1967	100.0	91.93	3.9	4.9
1968	104.2	98.70	3.7	3.2
1969	109.8	97.84	- .5	- 6.2
1970	116.3	83.22	- 7.5	-20.9
1971	121.3	98.29	9.1	13.8

Over the period 1955-71 the price index has risen by 50% while the stock price index has more than doubled. Thus, over this period the inflation exclusion would have resulted in somewhat heavier taxation of this income source than does taxing half the gain. (Stopping the calculation in 1968 would have suggested much heavier taxation of capital.) If the stock market movements are a better index of the need for expansion or contraction in the economy than the general price index, the inflation exclusion results in a better built in stabilizer than the current system, insofar as accrued taxable gains have a built-in stabilizing effect.

VIII. Conclusion

The argument for only taxi ıg gains in excess of the inflation rate is not new, although the justification in terms of the Samuelson analysis may be new. Considered as an improvement in the CTB approach the inflation exclusion increases both equity and political acceptability (in that it is less of a departure from the current taxburdens) and seems a candidate for the type of serious research which the CTB approach has received. An additional benefit may be a decrease in opposition to expansionary policy insofar as some of that opposition was based on the increased tax burden on capital during inflationary times.

APPENDIX

We shall show that the value of an asset to the consumer is independent of the rate of tax when (i) true accrued capital gains are taxed, (ii) a deduction is allowed related to the amount of capital value, not the amount of gain, and (iii) all income is taxed so the consumer's interest rate declines by the tax. (This is a partial equilibrium analysis of the demand for assets, and not a general equilibrium analysis of the actual change in interest rates when a tax is introduced.) This implies that the interest rate times the value of the asset is the basis of tax. After this analysis there is a brief presentation of this problem in excise tax notation to show the importance of capital gains taxation to the raising of revenue.

Let us denote the instantaneous real interest and inflation rates[15] by $r(t)$ and $i(t)$. Then the interest and inflation factors are

$$R(t) = \exp \int_0^t r(s)ds \qquad (A1)$$

$$I(t) = \exp \int_0^t i(s)ds \qquad (A2)$$

Denoting allowable depreciation (the negative of capital gains) by $D(s)$ and the flow of dividends to the consumer by $N(s)\,I(s)$, we can write the value of an asset at time t with a proportional income tax of rate $1 - T$ as $V(t,T)$:

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[15] The relevant distinction here is between taxable and nontaxable return.

$$V(t,T) = \int_t^n R^T(t)\, I(t)\, R^{-T}(s)\, I(s) \left\{N(s)\, I(s) - (1-T)(N(s)I(s) - D(s)\right\} ds \tag{A3}$$

Differentiating this equation with respect to time we have

$$\frac{\partial V(t,T)}{\partial t} \equiv V' = (Tr + i)V + TNI - (1-T)D \tag{A4}$$

Setting the depreciation allowance equal to the decrease in value plus the inflation exemption we have

$$D = -V' + iV \tag{A5}$$

Substituting this in (A4) we see that the rate of change of value satisfies an equation the form of which is independent of the tax rate

$$V' = (Tr + i)V + TNI + (1-T)(V' - iV) \tag{A6}$$

or $$TV' = T(r + i)V + TNI \tag{A7}$$

Since the asset has zero value at time n independent of the tax rate, the value at any time is independent of the tax rate.

Thoroughly changing notation, let us examine the behavior of a firm in an excise tax setting without capital gains taxation. Let us denote by q and p, consumers' prices and producer's prices (their difference being the tax structure). Let us denote by y the firm's production plan (net outputs) and by z, the dividend pattern. The standard model of a firm is the maximization of profits at producer prices:

$$\begin{aligned} &\text{Maximize } p \cdot y \\ &\text{subject to } y \in Y. \end{aligned} \tag{A8}$$

If there are any profits, these are presumably paid to the owner of the firm in units of numeraire good, with the firm having no choice as to the good in which dividends are paid. If the firm can choose the goods in which to pay dividends (and makes all transactions at producer prices), the firm which maximizes its value to consumers chooses y and z to

$$\begin{aligned} &\text{Maximize } q \cdot z \\ &\text{subject to } pz = py \\ &\qquad\qquad y \in Y \\ &\qquad\qquad z \geq 0 \end{aligned} \tag{A9}$$

(The last constraint represents the absence of forced owner constributions of capital and is necessary to keep the maximization well defined if q and p are different vectors, apart from scalar multiplication.) This formulation may strike the reader as odd since firms pay dividends by and large in cash not commodities for a variety of obvious reasons. However, viewed as an intertemporal problem, with one good each period, firms choose the timing of the payment of cash dividends and so choose the commodities in which to pay dividends. Thus the absence of capital gains taxes permits the firm to tailor its dividend payments to the consumption stream of the owner and thus lessen the impact of income taxation.

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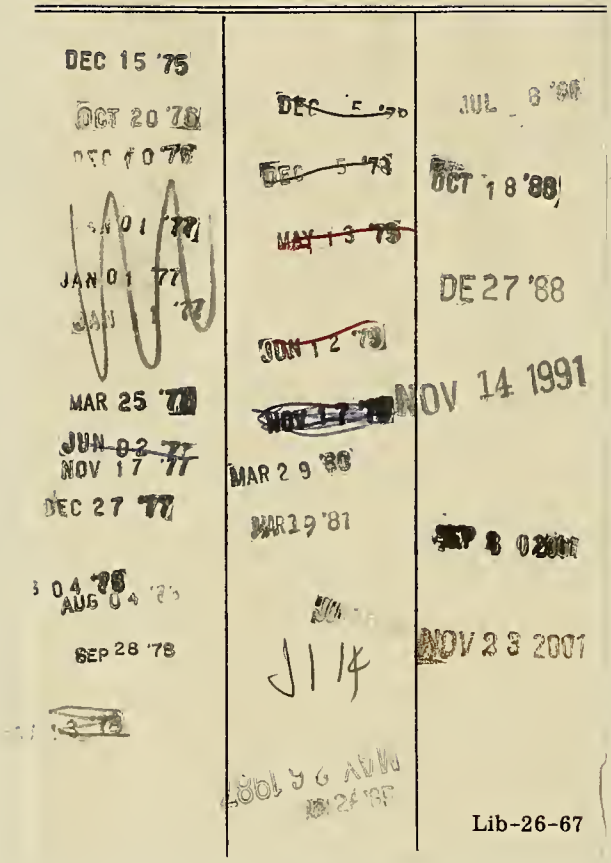
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